



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,450	12/02/2003	Anthony I. Chou	YOR920030451US1 (8728-657)	6760
46069	7590	01/21/2005	EXAMINER	
F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			LEE, CALVIN	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 01/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/726,450	Applicant(s) CHOU et al.	
	Examiner Lee, Calvin	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-29 and 31-34 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-29 and 31-34 is/are allowed.
- 6) ☒ Claim(s) 1 and 4-9 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 U.S.C. § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 6-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Khare et al* (US 2002/0130377) in view of *Chiou et al* (US 2002/0094593).

Khare et al discloses a method of forming a dielectric layer, comprising the steps of:

-growing an oxynitride dielectric layer 24 having a thickness of 15Å [¶ 0018]

-performing a plasma nitridation of the oxynitride layer [¶ 0019-0020]

a) *Khare et al* suggests the anneal treatment at about 550°C [¶ 0027], but not explicitly at suggest at a temperature of about 400°C for about 20 min. First of all, *Khare et al* suggest a temperature reasonably close to the claimed temperature range, prima facie obviousness is established due to the expectation of similar results for similar ranges. See *Titanium Metals Corp. of America vs. Banner*, 778 F.2d 775, 783.

Although *Khare et al* is silent about the anneal time, the examiner takes the Office Notice of the anneal time is notoriously well known in the art as seen by *Chiou et al* teaching to anneal an oxynitride layer in a mixture of N₂/O₂ at a temperature of about 300 °C and 900 °C for a time range between about 1 min and about 30 min [¶ 0036].

It would have been obvious to one having ordinary skill in the art to have modified the anneal of *Khare et al* by utilizing the anneal temperature and time, suggested by *Chiou et al*, because one would adjust either temperature or time to result in the most effective nitridation of the dielectric layer.

b) In re claims 7-9, since *Khare et al* discloses the oxynitride gate dielectric in a semiconductor device, *Khare et al* inherently teaches or suggests that such semiconductor device is selected from a group comprising conventional devices such as: FET, MIM capacitor, etc For reference, US 6,420,739 to *Yokoi* discloses a conventional semiconductor device having an FET, a semiconductor resistor element, and an MIM capacitor [Figs. 1A-1H and col. 1].

3. Claim 4-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Khare et al* and *Chiou et al* in view of *Basceri et al* (US 2002/0094593).

Khare et al teaches a gate dielectric for an integrated circuit device, but is silent about the device gate. Although *Chiou et al* does not suggest the gate/electrode metal being aluminum, *Chiou et al* discloses "it is not necessary to uses an especial metallic material of the ohmic electrode" [col. 3, ln.33]. Nevertheless, such gate electrode of aluminum capping a dielectric is known in the semiconductor as evidenced by *Basceri et al* disclosing a dielectric 34 sandwiched between bottom and top gate electrodes 32, 36 of aluminum [Fig. 1 and col. 14]

It appears as if any electrode material including the claimed electrode aluminum would work equivalently to any other well-known electrode metal as long as the desired electrode metal material has a lower etch rate than its gate dielectric.

Allowable Subject Matter

4. Claims 10-29 and 31-34 are allowed

Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim, because none of the cited arts suggests the annealing performed in a nitrogen ambient including an oxygen concentration of about 1 to about 10 parts per billion, & cooling a semiconductor device with the annealed oxynitride layer.

Response to Arguments

5. Applicant's arguments, dated Dec. 20, 2004, with respect to claims 1 and 4-9 have been considered but are moot in view of the new ground(s) of rejection. The arguments related to claims 2, 10-29, and 31-34 are persuasive.

Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at (571) 272-1896 from 7:00 to 5:00 (Mon-Thu). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* can be reached at (571) 272-1907. Any inquiry relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0596. The fax phones are (703) 872-9318 for regular communications and (703) 872-9319 for After-Final communications.



January 20, 2005